

REMARKS

Reconsideration of the above-identified application in view of the present amendment is respectfully requested.

By the present amendment, claims 33 and 42 have been amended to include the limitations that the mixture of metal powder and particulate oxidizer is formed without the use of a solvent and that the oxidizer is an inorganic salt oxidizer. Support for these limitations can be found on page 12, line 18 and page 14, lines 15 and 16.

Below is a discussion of the 35 U.S.C. §102(e)/§103(a) rejection of claims 33 and 35-44, the 35 U.S.C. §103(a) rejection of claims 33 26-42 and 44, and the 35 U.S.C. §103(a) rejection of claims 33 and 35-44.

1. 35 U.S.C. §102(e)/103(a) rejection of claims 33 and 35-45.

Claims 33 and 35-44 were rejected under 35 U.S.C. §102(e) as being anticipated by Martin et al. or under 35 U.S.C §103(a) as being unpatentable over Martin et al.

Claims 33 and 35-45 are neither anticipated by nor obvious in view of Martin et al. because Martin et al. do not teach or suggest an electrically actuatable igniter that includes an ignition material comprising uniformly dispersed mixture of a metal powder and a particulate oxidizer that is free of a binder and that is formed without the use of a solvent.

Martin et al. teaches that nano-aluminum powder and a particulate oxidizer are combined to form a propellant mixture and that the propellant mixture is ignited by a hot wire igniter. The propellant mixture comprises an oxidizer matrix that includes distributed metallic fuel particles. The oxidizer matrix is formed by dissolving the oxidizer in a solvent or providing the metallic fuel and the oxidizer in a binder.

In contrast, claims 33 and 42, the two independent claims in the present application, recite that the ignition material is free of a binder or the mixture of metal powder and particulate oxidizer is formed without the use of a solvent. This provides the ignition material recited in claims 33 and 42 with separate oxidizer and metal fuel particles as opposed to a matrix of oxidizer that encapsulates metallic particles, which is taught by Martin et al.

Additionally, it would not be obvious in view of Martin et al. to omit the use of a binder or a solvent. Either a binder or a solvent are required by Martin et al. to achieve an oxidizer matrix. To omit both a binder and a solvent would essentially teach away from the composition taught in Martin et al.

Claims 35-39 and 41 depend either directly or indirectly from claim 33 and therefore should be allowable for the same reasons recited with respect to claim 33 and for the specific limitations recited in claims 35-39 and 40.

Claims 43-44 depend either directly or indirectly from claim 42 and therefore should be allowable for the same reasons recited with respect to claim 42 and for the specific limitations recited in claims 43 and 44.

2. 35 U.S.C. §103(a) rejection of claims 33, 36-42, and 44

Claims 33, 36-39, 41, 42, and 44 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley et al., in view of Higa et al., Martin et al., Dixon et al., Wheatley, and Lundstrom.

Claim 33 is patentable over Kelley et al. in view of Higa et al., Martin et al., Wheatley, and Lundstrom because: (1) Kelley et al. in view of Higa et al., Martin et al., Wheatley, and Lundstrom do not disclose or suggest an ignition material that includes a uniformly dispersed mixture of an electro-exploded metal powder and an inorganic salt oxidizer, which has an average particle size of about 1 μm to about 30 μm , which free of binder, and that is formed without the use of a solvent: (2) it would not have been obvious in view of Higa et al., Martin et al., Wheatley, and Lundstrom to modify the teachings of Kelley to teach the invention recited in claim 33.

Kelley et al., as noted in the Office Action teaches a thermite composition in contact with a bridgewire of an electrically actuated igniter, comprising a pair of electrodes, a bridge wire and an ignition material of thermite. The thermite composition includes iron oxide having a particle size of about 0.5 microns and aluminum, having a particle size of about 1 micron. Kelley et al. do not teach that the aluminum is an electro-exploded metal powder, the oxidizer is an inorganic salt, the oxidizer has a particle size between about 1 and about 30 microns, and that the particles sizes of the aluminum and the iron oxide can be adjusted or that it is remotely desirable to vary the particle sizes.

Higa et al. teach that fine aluminum particles having particle sizes less than about 3000 nm can be used in a pyrotechnic composition or thermite. Higa et al. teach that the fine aluminum particles can be formed by electro-exploding aluminum wire.

Higa et al. provides no motivation to modify Kelley et al. to form a thermite composition with an inorganic salt oxidizer or an inorganic salt oxidizer having a particle size between about 1 micron and about 30 micron. Moreover, there is not suggestion in Kelley that it would be desirable to use nano-scale aluminum particles for the thermite composition in Kelley et al. As noted above Kelley et al., suggests using aluminum with a particle size of about 1 to about 30 microns not aluminum particles with particles sizes on a nano-scale.

Martin et al., as noted above, teach agglomerates of ammonium perchlorate/nano-aluminum matrix and composites of ammonium perchlorate, nano-aluminum particles, and binder that can be used in a propellant mixture. Therefore, Martin et al. teach away from a

has indicated that this is impermissible (See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Thus, claim 33 is not obvious over Kelley et al., Higa et al., Martin et al., Wheatley, and Lundstrom. Therefore, allowance of claim 33 is respectfully requested.

Claims 36-39 and 41 depend either directly or indirectly from claim 33 and therefore should be allowable for the same reasons recited with respect to claim 33 and for the specific limitations recited in claims 36-39 and 41.

Claim 42 contains limitations similar to claim 33 and therefore should be allowable for the same reasons as claim 33 and for the specific limitations recited in claim 42.

Claim 44 depends directly from claim 42 and therefore should be allowable for the same reasons recited with respect to claim 42 and for the specific limitations recited in claim 44.

3. 35 U.S.C. §103(a) rejection of claims 33 and 35-45

Claims 33 and 35-39, and 41-44 were rejected under 35 U.S.C. 103(a) as being unpatentable over Baginski in view of Halcomb et al., Dixon et al., Wheatley, and Lundstrom. Applicant respectfully traverses this argument.

Claim 33 is patentable over Baginski in view of Halcomb et al., Dixon et al., Wheatley, and Lundstrom because: (1) Baginski in view of Halcomb et al., Dixon et al., Wheatley, and Lundstrom do not disclose or suggest an ignition material that includes a uniformly dispersed mixture of an electro-exploded metal powder and an inorganic salt oxidizer, which has an average particle size of about 1 μm to about 30 μm , which free of binder, and that is formed without the use of a solvent: (2) it would not have been obvious in view of Halcomb et al., Dixon et al., Wheatley, and Lundstrom to modify the teachings of Baginski to teach the invention recited in claim 33.

Baginski, as noted in the Office Action, teaches the basic invention of explosive primers with a pyrotechnic mix around a bridgewire. The pyrotechnic compound can include zirconium and potassium perchlorate, or alternatively other pyrotechnic compounds, such as titanium hydride potassium perchlorate and boron potassium nitrate.

Baginski does not teach an ignition material that includes a metal powder selected from the group consisting of electro-exploded aluminum powder, electro-exploded titanium powder, electro-exploded copper powder, electro-exploded zinc powder, and electro-exploded yttrium powder. Baginski also does not teach using an oxidizer that has an average particle size of about 1 μm to about 30 μm .

Halcomb et al. teach a thermite composition that uses a finely divide aluminum powder and a metal oxide such as iron oxide, copper oxide, tungsten oxide, or chromium oxide.

Halcomb et al. do not teach an ignition material that includes a metal powder selected from the group consisting of electro-exploded aluminum powder, electro-exploded titanium powder, electro-exploded copper powder, electro-exploded zinc powder, and electro-exploded yttrium powder. Halcomb et al. also do not teach using an inorganic salt oxidizer and that the inorganic salt oxidizer has an average particle size of about 1 μm to about 30 μm .

Dixon et al. teach a lead free combustion primer that includes a metastable interstitial composite. The metastable interstitial composite includes aluminum and molybdenum trioxide having a particle size of about 0.1 μm or less.

Dixon et al. do not teach a metal powder selected from the group consisting of electro-exploded aluminum powder, electro-exploded titanium powder, electro-exploded copper powder, electro-exploded zinc powder, and electro-exploded yttrium powder. Dixon et al. only disclose that the aluminum particles have a particle size of less than 0.1 μm not that they are formed by electro-explosion. As noted above and in the specification, electro-exploded metals form nano-sized particles that agglomerate into micron-sized powders. Dixon et al. neither disclose nor suggest that the aluminum particles in Dixon et al. have this feature. Dixon et al. only discloses that the particles form metastable interstitial composites.

Moreover, Dixon et al. state that the oxidizer is a molybdenum oxide. Molybdenum oxide is a metal oxide not an inorganic salt oxidizer. Further, Dixon et al. state that the particle size of the oxidizer (i.e., MoO_3) is preferably less than 0.1 μm . Whereas, in the invention recited in claim 33, the oxidizer has a particle size of about 1 μm to about 30 μm . Thus, Dixon et al. provides no motivation to modify the teachings of Baginski et al. to achieve the invention recited in claim 33.

Wheatley teaches a gas generating composition that includes an ammonium nitrate or a strontium nitrate based oxidizer mixture. (Column 2, lines 21-23). The gas generating composition also includes exploded aluminum powder. The exploded aluminum powder is used as a combustion modifying additive to increase the burning rate and lower the pressure exponent of the ammonium nitrate or strontium nitrate gas generating composition. (Column 3, lines 31-35).

Wheatley does not teach that the oxidizer has an average particle size of about 1 μm to about 30 μm . Moreover, it would not have been obvious to use the electro-exploded powder taught in Wheatley in the ignition compositions taught in Baginski and Halcomb et al. Wheatley teaches using exploded aluminum as an additive to an ammonium nitrate based gas generating composition to lower the pressure exponent and increase the burning rate of the ammonium nitrate gas generating composition. The ignition compositions taught in Baginski and Halcomb et al., however, do not include ammonium nitrate and would therefore not have

a high pressure exponent and a low burning rate, which is caused by ammonium nitrate. Hence, there would be no reason to add electro-exploded aluminum to the ignition compositions of Baginski and Halcomb et al.

The Office Action suggests that one using the electro-exploded aluminum in a similar pyrotechnic composition would expect similar results, and therefore its substitution would have been obvious. The pyrotechnic compositions taught in Baginski and Halcomb et al. are not similar pyrotechnic compositions to the gas generating composition taught in Wheatley. The pyrotechnic compositions taught in Baginski and Halcomb et al. are primary ignition composition that use a metal as the primary fuel in combination with an oxidizer. The composition of Wheatley, in contrast, is a gas generating composition that includes an organic fuel, an oxidizer, and a metal additive. It is mere speculation, at best, whether the addition of a metal additive, which is used to increase the burning rate and lower the pressure exponent of a gas generating composition, would also increase the burning rate and lower the pressure exponent of an ignition composition. Further, there is nothing in the prior art that suggests that the addition of electro-exploded aluminum to a pyrotechnic composition would even be desirable.

Lundstrom teaches a chlorate free auto-ignition composition that includes an azodiformamidine dinitrate, an oxidizer, and an accelerator. The accelerator used in conjunction with the azodiformamidine dinitrate preferably includes a fine iron oxide powder, which has an average particle size of about 3 nm.

Lundstrom does not teach an ignition material that includes a metal powder selected from the group consisting of electro-exploded aluminum powder, electro-exploded titanium powder, electro-exploded copper powder, electro-exploded zinc powder, and electro-exploded yttrium powder. A fine iron oxide with a particle size of about 3 nm is not an electro-exploded aluminum powder, electro-exploded titanium powder, electro-exploded copper powder, electro-exploded zinc powder, and electro-exploded yttrium powder. Accordingly, even if Lundstrom did suggest modifying the teaching of Baginski et al. to use a fine iron oxide powder, it would still not meet the invention recited in the claims.

Thus, claim 33 is not obvious over Baginski in view of Halcomb et al., Dixon et al., Wheatley, and Lundstrom. Therefore, allowance of claim 33 is respectfully requested.

Claims 36-39 and 41 depend either directly or indirectly from claim 33 and therefore should be allowable for the same reasons recited with respect to claim 33 and for the specific limitations recited in claims 36-39 and 41.

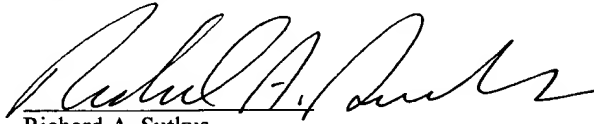
Claim 42 contains limitations similar to claim 33 and therefore should be allowable for the same reasons as claim 33 and for the specific limitations recited in claim 42.

Claim 44 depends directly from claim 42 and therefore should be allowable for the same reasons recited with respect to claim 42 and for the specific limitations recited in claim 44.

In view of the foregoing, it is respectfully submitted that the above-identified application is in condition for allowance, and allowance of the above-identified application is respectfully requested.

Please charge any deficiency or credit any overpayment in the fees for this amendment to Deposit Account No. 20-0090.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Richard A. Sutkus", written over a horizontal line.

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